

# Midterm 1 Practice

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## 1 Data

### NHES Data

Average Weight: 122 lbs, SD: 30 lbs

Average Systolic BP 127 mmHg, SD 14 mmHg

$r = 0.5$ , Data is homoscedastic

### IQ data

A group of 100 people were given an IQ test when they were 18 and then again when they were 35. At both ages the average IQ was 100 and the SD was 15, with  $r = 0.8$ . The data is homoscedastic.

## Questions

### Basic

1. Let  $L$  be a list of numbers. If I add 4 to each element of  $L$  and then divide each element by 2, what happens to the SD? How about if I divide each element by 2 first and then add 2 to each element?
2. What is the minimum amount of numbers I need to add to the list  $L = \{1, 1, 2, 4, 10, 10\}$  to make its median increase by at least 5?
3. (NHES Data) What is the expected increase in BP associated with a 30 pound increase in weight?
4. (NHES Data) What BP would you predict for somebody who weighs 137 lbs?
5. (NHES Data) What weight would you predict for somebody with BP 148 mmHg?
6. (NHES Data) What percentage of people who weigh 128 lbs do you expect to have a BP above the population's average?
7. We are playing cards with a regular deck. I deal you 6 cards. What is the probability that you got 4 of a kind and also a pair?
8. How many ways are there to construct a committee of 4 people from a group of 10 people?

### Medium

9. Construct a list 4 elements with SD 3.
10. How many ways are there to construct a committee of 4 people from a group of 10 people, if one person is distinguished as the head?
11. (IQ data) What percent of people who had an IQ of 120 on the first test do you expect to score lower on the second test?

### Hard

12. Construct a list 4 elements with SD 3 and average 10.
13. (IQ data) In what percent of the population do you expect regression to decrease their score? Why?
14. I work at an ice cream store with 10 flavors. People can order either 1, 2 or 3 scoops. How many different orders are possible?

## 2 Answers

1. In both cases the SD is cut in half.
2. 3 elements
3. 7 mmHg
4. 130.5 mmHg
5. 144.5 lbs
6.  $54\% \pm 1\%$
7.  $\frac{\binom{13}{1}\binom{4}{4}\binom{12}{1}\binom{4}{2}}{\binom{52}{6}}$
8.  $\binom{10}{4}$
9.  $\{-3, -3, 3, 3\}$
10.  $4\binom{10}{4}$
11.  $67.385\% \pm 1\%$
12.  $\{7, 7, 13, 13\}$
13. 50%.
14. 285